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# (12) UK Patent Application (19) GB (11) 2 360 484 (13) A

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(71) Applicant(s)

David Mullan

2 Blaon Cottages, Snitterfield Lane,  
NORTON LINDSEY, Warwickshire, CV35 8JJ,  
United Kingdom

(72) Inventor(s)

David Mullan

(74) Agent and/or Address for Service

Harrison Goddard Foote  
Tower House, Merrion Way, LEEDS, LS2 8PA,  
United Kingdom

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F2G G1 G35

(56) Documents Cited

GB 2192578 A

GB 2192577 A

GB 2179584 A

GB 1572099 A

GB 1477074 A

EP 0031978 A1

US 5643521 A

US 5271880 A

(58) Field of Search

UK CL (Edition R ) B5A AA1 AB1 AB18 AT14M  
INT CL<sup>7</sup> B29C 45/14 , B29D 23/00  
Online: WPI EPODOC JAPIO

(54) Abstract Title

**Pipe or conduit fitting with an internal seal**

(57) A pipe/conduit end fitting with integral thermoplastic elastomer seal. Seal can be applied to many types of pipe/conduit fitting in many industrial applications.

The seal being internal and integrated offers the producer marketing advantages due to the technically superiority over loose assembled seals.

(Elimination of one leakage path)

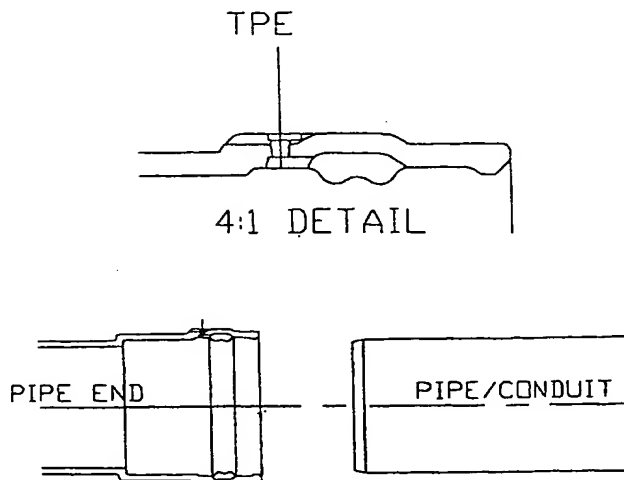
(Cannot be pushed out of position on assembly)

Manufacture of such parts is 'cost effective.

Assembly 'on site' of such parts is cost effective as it is quicker.

The integrity of the seal excellent as one leakage path is eliminated and the second leakage has sealing at two points.

The seal is injection moulded in a second stage of the injection moulding process through an orifice or feed point in the sidewall of the fitting moulded in the first stage. The fitting may be produced with a 90 degree bend.

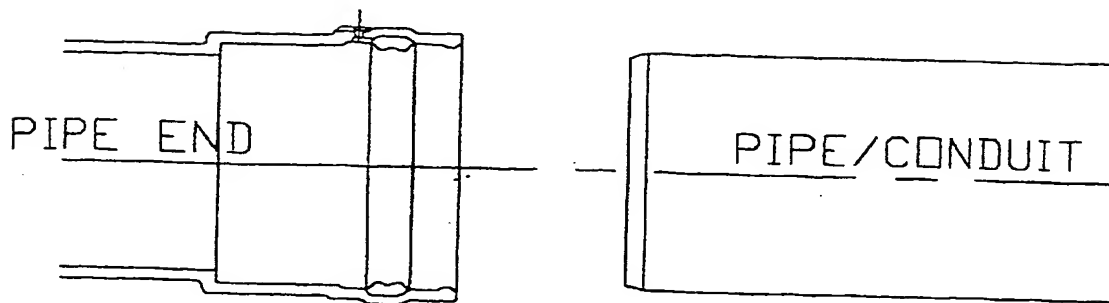
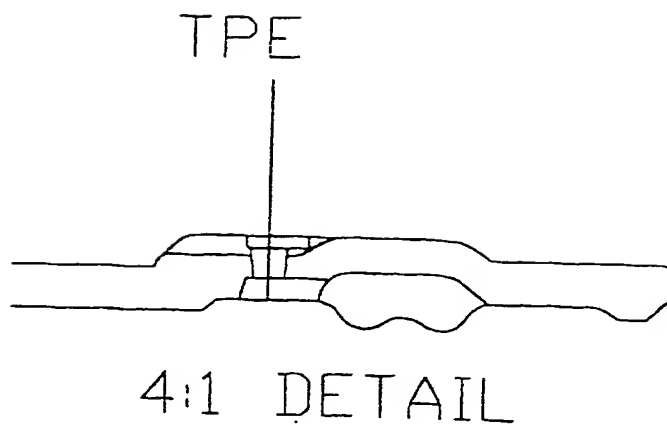


PIPE END SEAL

At least one of these pages has been prepared from an original which was unsuitable for direct photoreproduction.

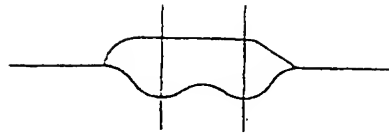
GB 2 360 484 A

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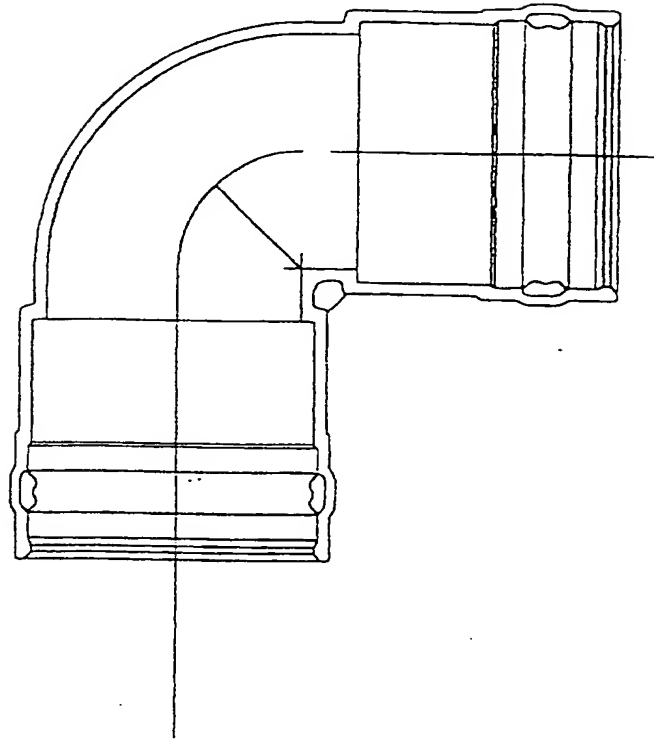


PIPE END SEAL  
DRWG 1.

2/5

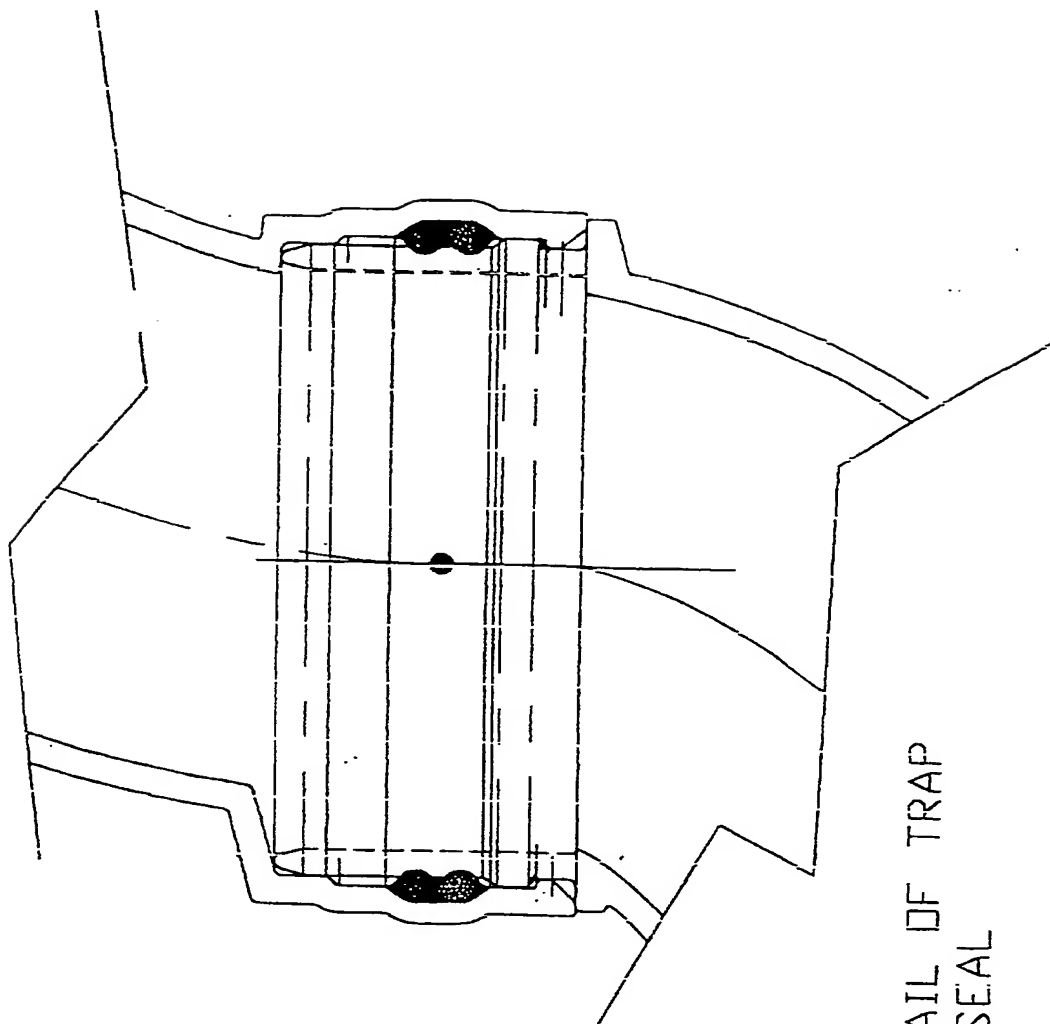


4:1 SEAL DETAIL



DWG 2.

3/5

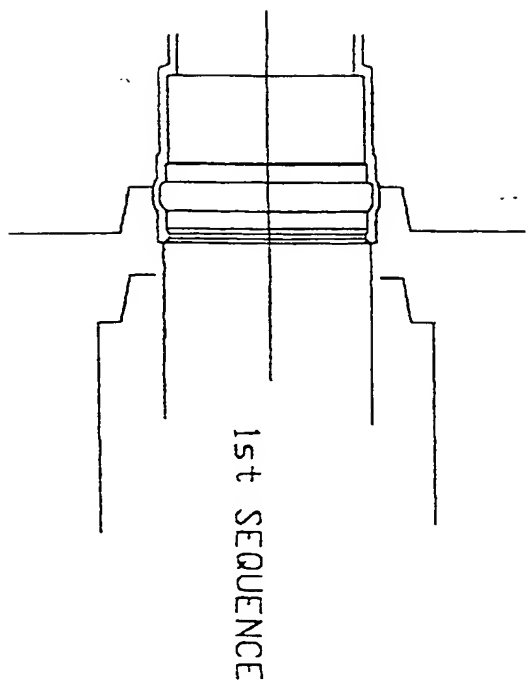
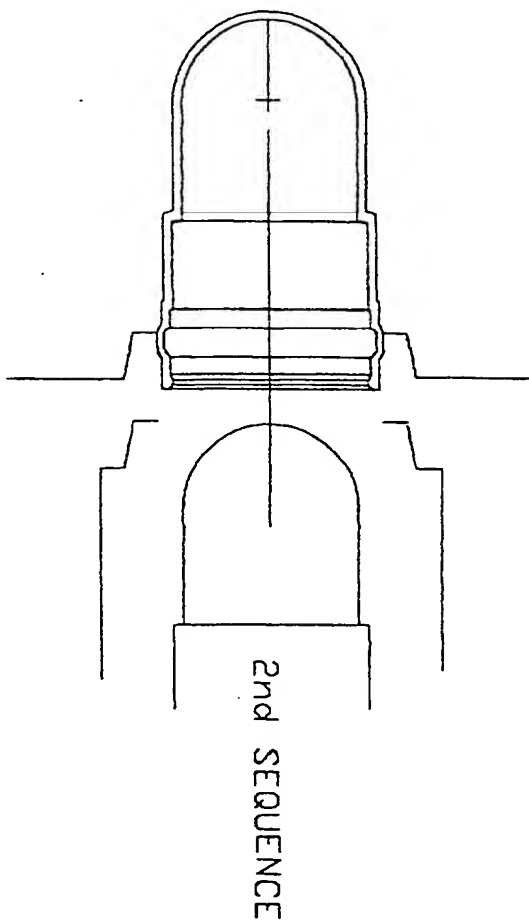
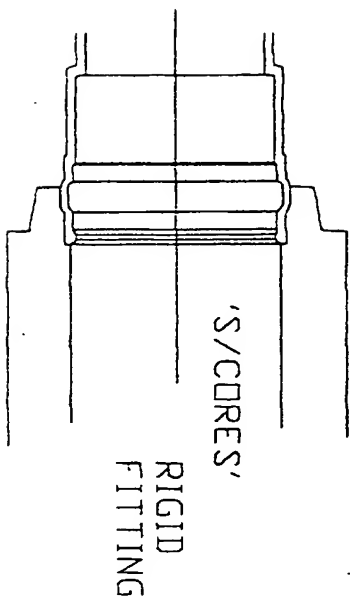


5:1 DETAIL OF TRAP  
'SNAP' SEAL

4/5

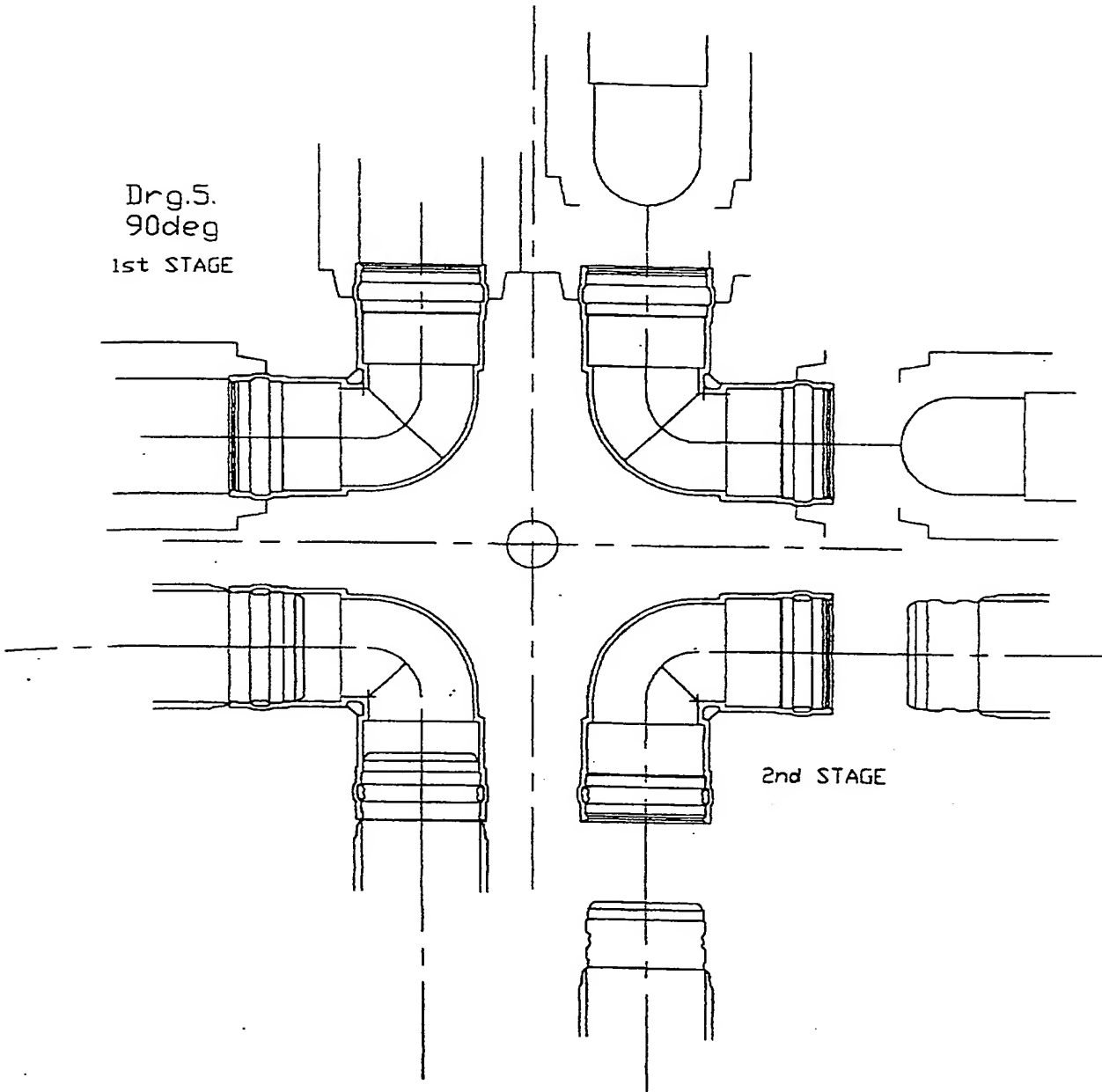
Dwg. 4.

SEQUENTIAL 'CORE' PULLING  
1st STAGE MOULDING



5/5

Drg.5.  
90deg  
1st STAGE





PLASTIC 'PIPE/CONDUIT END' WITH INTEGRAL INTERNAL SEAL  
Seal SHT.1/3

Quick-

*A plastic pipe fitting//bend/conduit/'water trap has a pipe end to receive a pipe/conduit*

*The pipe/conduit end has an internal annular (could be rectangular, oval, etc) Thermoplastic Elastomer seal which is injection moulded through an orifice or 'feed point' in the sidewall of a moulded fitting/bend/conduit/water trap outlet/inlet ( 2<sup>nd</sup> stage injection moulding)*

*Ref Dwg 1.*

*This process could be used to manufacture pipe/conduit bends 90/135/180degree or any other angle required  
It could also be applied to tubular 'water traps'*

*Ref Dwg's 2and3.*

*It offers a technically superior product as the naturally occurring 'cross-linking' of the polymers provides excellent adhesion/fusion giving an integrated 'pipe/conduit end' which eliminates one leakage path  
The seal being integrated cannot be dislodged when pushing in the pipe/conduit  
The seal is internal and therefore protected from damage*

#### *TO SUMMARISE*

*Immovable integrated seal*

*Technically superior sealing due to elimination of one leakage path*

*Reduced manufacturing costs as parts can be made Automatically*

*Significant 'on site' cost savings*

### *Quick-Seal SHT2/3*

*The manufacturing of these parts involves 1<sup>st</sup> and 2<sup>nd</sup> stage injection moulding of two resins, one being a thermoplastic elastomer*

### *TOOLING FOR PRODUCTION OF PARTS*

*The injection mould tooling required to produce such parts as stated would require 1<sup>st</sup> and 2<sup>nd</sup> stage injection moulding*

*The 1<sup>st</sup> stage of the moulding sequence would be to injection mould the 'rigid' pipe/conduit fitting and the 2<sup>nd</sup> stage to injection mould the internal seal*

*This would involve design and manufacture of so called 'side core' tooling in which the 'core-pulling' would be sequenced*

*The design of the pipe end facilitates this as there is an angular 'ramp'*

### *METHOD*

*As previously stated the 1<sup>st</sup> instance an injection moulded 'rigid' fitting is produced e.g. 90degree pipe bend (ref Dwg.2.)*

*The 'side cores are sequentially extracted to allow the pipe/conduit end to expand and allow the central 'side core' to clear the undercut*

*There would be a limit on the depth of the undercut*

*At this stage the entry point (orifice) for the t.p.e. seal is also produced in the injection mould*

*Ref. Dwg.4.*

*The part is then moved to another point to mould the seal through this orifice/'feed point'*

*This constitutes the 2<sup>nd</sup> stage of the moulding process*

*The moving of the part (after 1<sup>st</sup> stage moulding) can be manual or automatic*

*If the two moulding stages are to be achieved automatically (which is preferred) then a 'robot' could be used to 'pick and place'*

*A typical injection mould layout is shown as an example*

*Ref.Dwg.5. (90deg. Bend)*

## *CONCLUSION*

*To summarise therefore-The manufacture this type of pipe end can be produced using relative tooling methods in dedicated injection mould tooling and production processes*

*The plastic resins referred to are currently available in today's 'marketplace'*

*The examples given in the drawings refer mainly to the manufacture of 'waste water ' fittings as used in the plumbing industry but would not exclude other pipe/conduit applications*

## CLAIM

## Quick-Seal

*The pipe/conduit end has an internal seal which has been moulded in the 2<sup>nd</sup> stage of the injection moulding process*

*This seal being integral eliminates one of the leakage paths ( there are two leakage paths in loose assembled 'O'-seals) For this reason the seal is technically superior to loose assembled seals*

*The seal being internal cannot easily be damaged*

*The seal being integral (polymer cross linked and bonded) cannot be pushed out of position on assembly*

*The 'on site' assembly is quicker and therefore 'cost effective'*

*The manufacture of such parts can be automatic in 1<sup>st</sup> + 2<sup>nd</sup> stages of injection moulding and therefore 'cost effective' to produce*

*There would be a competitive advantage for a company producing parts in this way*

*The remaining leakage path of the seal has two 'O'-ring shaped sealing points*

*('Sequential 'core pulling' is used in both 1<sup>st</sup> and 2<sup>nd</sup> stage moulding)*

*The resin (Thermoplastic elastomer) is specifically injection moulded through an orifice/'feed point' through the side wall of the rigid fitting  
Ref Drwg 1)*

*The orifice/'feed point' is formed during the 1<sup>st</sup> stage of the injection moulding process*

*The fitting produced in the 1<sup>st</sup> stage of the injection moulding process is a 'rigid' fitting*

*The fitting produced in the 1<sup>st</sup> stage of the injection moulding process is moved to another position within the tool/tools to allow the 2<sup>nd</sup> stage of the injection moulding process to take place (The T.P.E. seal)*

*An example of a moulded part produced in this way is shown in Dwg.2*



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Application No: GB 0007575.4  
 Claims searched: The claim

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Examiner: Monty Siddique  
 Date of search: 8 June 2000

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
 UK CI (Ed.R): B5A (AA1, AB18, AT14M)  
 Int CI (Ed.7): B29C 45/14; B29D 23/00  
 Other: Online: WPI EPODOC JAPIO

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2192578 A (WAVIN) page 1 lines 100-113, 123-127, two-stage injection moulding process wherein, the seal is injected in the second stage	the claim
X	GB 2192577 A (WAVIN) similar to GB 2192578	the claim
X	GB 2179584 A (HEPWORTH) entire document, page 1 lines 82-128 etc, injection moulded pipe fittings with injection moulded internal elastomeric seals	the claim
X	GB 1572099 (HEPWORTH) page 1 lines 78-79, page 2 lines 33-36, 65-70 and entire document	the claim
X	GB 1477074 (HEPWORTH) page 2 lines 36-46, 60-63, 90-95, claim 4 and the entire document	the claim
X	EP 0031978 A1 (WAVIN) entire document and page 4 line 26-page 5 line 29 etc.	the claim
X	US 5643521 (DIETER) injection moulding the body of the fitting followed by injection moulding both internal and external elastomeric seals	the claim

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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Application No: GB 0007575.4  
Claims searched: The claim

Examiner: Monty Siddique  
Date of search: 8 June 2000

Category	Identity of document and relevant passage	Relevant to claims
X	US 5271880 (ILLINOIS...) column 3, three stage process where the sealing member is injection moulded in the second stage though it is the third stage which forms the coupler/fitting body	the claim

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.